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. THESIS

For the Degree of Doctor of Medicine

of Edinburgh University

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# TRACHOMA

BY

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## CONTENTS.

## INTRODUCTION.

I was led to take up a special study of Trachoma

(1) by the enormous numbers of cases I saw in my private work, both in my consulting room, and especially in passing Chinese emigrants to North and South America and Manila, and

(2) by having the misfortune to acquire the disease personally.

I regret that the exigencies of a busy practice prevented me going more thoroughly into the pathological study of the disease, but even if I had had the time, I had not the necessary apparatus, so that my pathological investigation has mainly been the examination of discharge and swabs taken from an expressed follicle: though now that we are fitting up a pathological department at our College of Medicine, I hope to continue my investigations with the help of our pathologist.

Another regret I have to express is the impossibility of keeping my attention on my Chinese patients: they disappear into the country in the middle of treatment and sometimes never come back so that I have not been able to make what I called reliable estimates as to its frequency amongst the population. Though I find that Hirschberg quotes the/

the proportion in Canton as 7 per cent, I very much doubt the accuracy of his observation, as the population is so migratory.

Recently the outcry against Trachoma has led the Colonial Government to take active steps to fight the disease, and to begin with, an examination of the school children is being made, and here I can give figures which are reliable, as my partner Dr. Jordan, an old Edinburgh graduate, has been honoured by His Excellency, The Governor, in being asked to regulate the work that is being done.

Out of 3,000 pupils already examined it was found that 15% were free, 40% mild, 40% bad, and 5% very bad. Indians and Japanese children were found to be the worst, and curiously enough in Queens College with about 1,000 boys, the lower classes were worse than the upper classes, which almost looks as if they grew out of it, but I prefer to say that it is due to their being taught European cleanliness.

One of the causes for the spread of the disease amongst Chinese is the national habit of their going regularly to the barber to have their lids combed and brushed, at the same time as having their head shaved.

Also the habit they have at dinner parties of a servant going round with a cloth wrung out of hot water and wiping the face of each guest, may have an influence/

influence on its spread.

I would draw attention to two points I have not seen in any writing on the subject.

(1) The Oriental's almond like eye, and the want of the bridge of the nose, making them more susceptible.

(2) The horizontal "wrinkle" at the outer canthus as a diagnostic point: I grant that this may arise from any condition causing Photophobia, but I have invariably noticed it in my Trachoma cases, and think it is a point worth noticing.

I have met with the disease in all nationalities in Hong Kong, so that one can say that Trachoma is no respector of persons, but naturally is more evident in the poorer classes who have not the same advanced ideas on cleanliness.

With regard to schools, or institutions where it breaks out, I believe vigorous measures should be taken for its suppression, especially in the way of segregation, cleanliness, plenty fresh air, plenty water, towels for each patient.

## AETIOLOGY.

The people that are particularly subject to Trachoma are the young, weak, delicate people with pale faces, flabby muscles, and narrow chests; the lower classes, because they are often deprived of good food, suitable clothes, and proper dwellings, while the better classes of the community usually escape. There is a great liability to the disease among those who are not trained for fatiguing work, and may unexpectedly be called upon to undergo some severe strain; persons with any hereditary taint or diathesis, and especially, such as have not fully recovered from an attack of some disease such as syphilis and arthritis. It is to be found in overcrowded dwellings, in close, damp and dirty dwellings, especially along the warm sea coast.

Trachoma, it must be admitted, is an infectious disease spread by contact; and also individual predisposition plays a part, and we must also consider as minor causes, climate, the influence of the atmosphere, soil and race, altitude and latitude, social conditions, overcrowding, uncleanliness, and bad hygienic conditions.

The contagion is spread by conveying discharge from eye to eye: however it may be conveyed: but we cannot/

cannot put aside altogether the supposed Trachoma germ as not being able to exist outside the body, as I have seen many cases where no history of contact could be proved: and this makes one think it can be conveyed by means of dust, and even water, in so much, as speaking personally, my eyes were much worse in the warm weather, making me wonder if I had got a re-infection.

The chief seat of infection is the family dwelling, especially among the poor, with their small and frequently overcrowded dwellings, by personal contact, using common washing utensils or other articles.

Schools play a small part in the spread of Trachoma, in fact in my introductory remarks, you will remember that dividing the school into upper and lower halves, and presuming the lower half to be those more recently admitted to the school, there was a greater percentage of trachoma in the lower half.

The nature of the infectious agent has not yet been made out, but on examining the discharge, one gets a variety of results, especially frequent a micrococcus, which was frequently in the form of a diplococcus: again one finds a bacillus, which is specially like the Koch-Weeks bacillus.

I/

I have already spoken of the individual predisposition, but now I should like to say that certain people appear to be immune, explained by Kundt to be due to certain chemical or bactericidal properties of the lachrymal secretion.

The next point I would like to emphasise, and which has been corroborated by numerous writers, is that the scrofulcus patient is specially predisposed to be easily infected by Trachoma, and even in people with otherwise perfect health, if there is a possibility of obstinate conjunctivitis.

I would also point out that the occupation of a patient is important, e.g. those whose work entails their working in a foul and dusty atmosphere, such as miners and masons, also especially in my experience those whose calling makes them come in contact with sand or dry dust.

Many writers note as specially important the age and sex of the patients, in my own experience there is nothing to be gained by tabulating one's cases in this particular way, for I have had all classes or rather stages of Trachoma at all periods of life and equally bad in both sexes.

With regard to the influence of altitude in my own Oriental experience, the natives mostly live at the sea level and the majority of Europeans up the hilly/

hilly parts, I speak of course of the Island of Victoria, with Hong-Kong as its town, so I cannot give a fair expression of opinion as to the effects of altitude. In our decidedly cosmopolitan population, I have noticed and treated Trachoma in all nationalities, but as Chinese preponderate greatly, naturally the largest percentage is Chinese. And here I would point out a reason why I think the Chinaman is specially liable to Trachoma, which I have not seen noted in any authorities I have read, viz., the want of a bridge to the nose causing the distinct almond shaped eyes, which gives lodgment to the discharge more freely than in the European.

## PATHOLOGY and BACTERIOLOGY.

Pathologically, Trachoma occurs in two forms:- "papillary", limited to the conjunctival tarsi, in which the surface appears velvety from the formation and hypertrophy of pseudo-papillae, which may form raspberry projections: and "granular," due to the formation of grey, translucent, hemispherical bodies, much resembling grains of boiled sago. The latter are chiefly found in the folds, arranged in rows like a string of pearls. Granules are also found in the conjunctival tarsi but are smaller, yellowish in colour, or hidden by papillae. These granules have a tendency to grow deeply and invade the tarsus; and are specially characteristic of Trachoma, since follicles never occur here in follicular conjunctivitis. The granulations usually cease near the fornix, said to be due to the change in the epithelium. As a rule they begin in the lower lid, either in the groove between the edge and the tarsus, or near the fornix, the latter more frequently. They spread to the angles, especially the inner, involving the caruncle and its immediate neighbourhood, but also the outer angle. Similarly we find them in the subtarsal groove in the upper lid, and are most profuse/

profuse about the upper tarsus.

Papillae and granulations commonly occur together. The conjunctiva bulbi at the limbus follows, with the development of pannus trachomatosus. In this latter condition, the new formed tissue starts as usual at the limbus, but always in the upper part, and extends over the cornea. In the recent stage it is thin and often very vascular, and later on becomes thickened. It may become a dry pannus, Fuchs says that occasionally a dense white or yellow scar is formed, resembling a leucoma, but confined to the superficial tissues, or small white spots appear in the papillary area, close to the delicate blood vessels. Where the pannus is progressive, the opacity extends beyond the vessels which run vertically downwards, without anastomosing. In retrogressive pannus, the vessels extend beyond the opacity. The whole cornea may be involved.

Pannus Trachomatosus is not caused through continuity, but by contiguity with the affected lid. The inflammation spreads centripetally into the cornea, due to the prevalent direction of the blood and lymph streams.

Pannus Trachomatosus is capable of complete retrogression, so that the cornea can reacquire its normal/

normal transparency.

In the later stages, the epithelium is found normal and it may be free from infiltration by leucocytes, except quite late. Bowman's membrane may be in tact. The actual substantia propria can scarcely be recognised, the laminae being separated and split up into fibrillae by dense infiltration of lymphocytes.

Raehlmann has found nodular aggregations of lymphocytes in the cornea, resembling follicles, and very similar to the trachomatous nodules of the conjunctiva. In these advanced cases, Bowman's membrane was invaded, and the epithelium was then invaded by wandering cells.

The invasion of the epithelium, caused it to be loosened, and it may be rubbed off by the rough lid, and so give rise to ulcers.

Severe cicatrization may take place, commencing in the neighbourhood of the vessels.

The papillae and granulations ultimately retrogress, forming fine cicatricial bands. These appear as narrow white striae. The amount of cicatrization corresponds to the amount of hypertrophy. These white striae are more apparent over the tarsus, and gives rise to entropion.

The/

The Trachoma follicle consists of

(1) The Stroma

(2) The Cells

(3) The Vessels

(4) The Capsule.

The minute pathology of The Trachoma follicle is such that it invariably gives rise to discussion, and the majority of the best known authors on Trachoma, has each his own views on the four headings given above, personally I am not prepared to put forward any new idea on the pathology of the follicle.

Every investigator who has the opportunity of studying Trachoma, in shall I say such a "rich" district as I have worked in, invariably hopes to find some bacteriological cause for the disease, but as yet no organism has been discovered with sufficient regularit as to say it is the cause of Trachoma. One finds a bacillus in an acute case, but no evidence of it in later stages. I, after three years investigation, have come to the conclusion it is a mixed infection.

## SYMPTOMS and COURSE.

Trachoma is the rough, uneven, granular condition of the conjunctiva: and can be defined as a specific contagious form of conjunctivitis, extremely chronic, lasting months and years, and, when left to itself, causing serious and permanent impairment of vision, and frequently, even total blindness.

We have, for purposes of classification, trachoma (1) acute, (2) subacute, and (3) chronic. The most important and characteristic sign is the so called Trachoma body, or follicle, around which there is diffuse infiltration of the adenoid tissue.

The disease gives rise to secondary changes, especially to the formation of scarring.

In Acute Trachoma, the formation of follicles begins with symptoms of severe conjunctivitis, viz., redness, and swelling, lachrymation and probably pericorneal injection. At first, one only sees the follicles on the palpebral conjunctiva, notably so at the fornices and outer canthi. Their development can be best studied in the conjunctiva of the upper tarsus, where they look at first like deep grey or yellow specks, about the size of a pin's head, the so-called primary, elementary or crude granulations. These/

These become prominent after a few days or weeks, according to the severity of infection. A moderate swelling of the normal conjunctival folds - the papillary body - follows, and this is frequently so great as to obscure the follicles and render diagnosis difficult or even at first impossible.

Corneal complications often occur in the form of small peripheral ulcers, less frequently as a diffuse vascular opacity the "pannus trachomatosus." In favourable cases, the conjunctiva may be restored to its normal conditions in a few weeks after the follicles are absorbed, or the disease gradually passes in to the chronic form.

SUBACUTE TRACHOMA.

This is the stage of development and growth of the follicles, and in this stage, there is frequently nothing to be seen about the eye externally. The process may go on in one eye for some time, the other eye being free, it may be for weeks, months, years and it may be altogether, though the latter is rare. The palpebral conjunctiva shows some redness, slight swelling, and probably papillary hypertrophy on the upper tarsus. In the fornices and on the tarsal conjunctiva you may find the "primary granulations." The subjective symptoms are slight, flakes float about in the lachrymal secretion.

This/

This stage may remain stationary for months, until the primary granulations gradually develop in to fully formed follicles. The development of the follicles is unusually slow, grow in distinct rows in the region of the retrotarsal folds, or in small groups in the folds and the tarsal conjunctiva, or scattered here and there, the latter most frequently.
Inflammatory symptoms gradually increase, oedema of the lids and slight degree of ptosis appear, the edges of the lids lying tightly apposed to the globe.
The follicles are found quite over the mouths of the Meibomian glands, and are larger towards the retro-tarsal folds. These show large transverse folds filled with granules, besides marked papillary swelling, so that on eversion, thick, firm masses project.

These papillae are dark red, flesh coloured, or raspberry-like opaque bodies, looking at first like close cut velvet, and when fully formed are round or oval, greyish-red or greyish-yellow bodies like sago grains. Often in rows. Few vessels in their interior, but frequently surrounded by a rich network of blood and lymph vessels. The palpebral conjunctiva is much congested, while the lashes in the morning are matted together by the flaky discharge.
The/

The semilunar fold and caruncle are swollen and injected; the ocular conjunctiva is much congested, and at times shows a few follicles here and there. The subjective symptoms are increased, burning and pricking pain, gumming of the lids in the morning, pannus, superficial opacities and more rarely phlyctenules and superficial ulcers.

CHRONIC TRACHOMA may be divided into two stages.

(1) Degeneration and destruction of the follicles and (2) The process of cicatrization.

The degenerative stage, with breaking down and ulceration of the follicles, is ushered in by increased swelling and thickening of the conjunctiva due to diffuse lymphoid infiltration of the adenoid tissue. The follicles become confluent and no longer project.

They now appear as round yellowish spots in the midst of the tightly stretched conjunctiva, which is not so much injected and in the majority of cases firm and gelatinous, dirty yellowish-red in colour. The papillary swelling has practically gone. The ocular conjunctiva is much congested, opaque, thickened and discoloured. The surface of the follicle has broken down and on pressure the soft contents come out in the form of a comedo -like plug. You will often find minute depressions and possibly crateriform ulcers/

ulcers at the sites of the follicles.
The congestion again increases, and the surface may present the appearance of a granulating wound. Many follicles undergo transformation into dense fibrous tissue. The secretion is increased and changed, it is now purulent and I know from personal experience intensely infectious. In this stage the upper lid is usually more affected than the lower. Possibly absorption of the inflammatory products is favoured in the lower lid by the fact that the conjunctiva is less stretched and folded, and that it remains relatively at rest.

The subjective symptoms now are more marked and complications become frequent. The tarsus has become more or less involved, pannus is more marked and in some cases has led to softening of the cornea. Phlyctenules and corneal ulcers are very common and in by far the majority of cases vision is impaired. The palpebral fissures are narrowed, the lachrymal ducts become more and more implicated, whilst the semilunar fold and caruncle are now a single gelatinous mass.

The stage of cicatrization is merged into from the degenerative stage by the conjunctiva becoming more and/

and more disintegrated and converted into fibrous tissue; and at the same time the severe inflammatory symptoms die down. So now, one can say that the actual trachomatous process ends in the conjunctiva being gradually transformed into connective tissue. The adenoid tissue is destroyed, the conjunctiva becoming pale, and the discharge mucous, viscid, or stringy, or disappearing entirely. The edges of the lids may be coated with a fine white foam, which collects into large flakes, especially at the canthi. In the retrotarsal folds the remains of gelatinous tissue often persist, surrounded by cicatricial bands, and under the scarred conjunctiva there are concretions and small cysts with pultaceous or fluid contents.

In less advanced cases, cicatrices appear as spots streaks, network or irregular strands, or the conjunctiva, especially in the fornix, presents a dull, bluish grey appearance, as if caused with a thin layer of milk. In severe cases the conjunctiva becomes transformed into a tense, smooth, greyish-white or greyish-yellow mass of scar tissue. The upper tarsal conjunctiva shows a uniform depressed, cicatricial surface with a tendon-like lustre, and from this fibrous processes radiate outwards. Contraction of the cicatrix leads to symblepharon, distortion of the tarsus, entropion, trichiasis and distichiasis/

distichiasis, narrowing of the palpebral aperture, and considerable changes in the lachrymal apparatus. Dacryocystitis occasionally occurs. Pannus disappears to a great extent, though it may leave permanent diffuse opacities, or there may follow leucomata, keratectasia, anterior staphyloma, irido-choroiditis, secondary glaucoma or phthisis bulbi. In some cases the so-called xerosis ensues, with complete atrophy and drying of the conjunctiva, the epithelium becomes dry and this may extend to the cornea which becomes quite opaque.

Fortunately these complications and sequelae occur much less frequently in cases which have been seen early and suitably treated, but in all cases in which the cornea is involved there is a great tendency to sudden exacerbation and relapse.

The follicles consist essentially of lymph cells embedded in a fine meshwork of connective tissue.

There is no doubt that compared with subacute and chronic trachoma, the acute variety is rare, but one can say that almost without exception, both eyes are attacked in acute trachoma and one eye frequently alone in chronic trachoma the other eye remaining well for years.

A/

A source of error in the classification is the fact that many observers, classify as acute trachoma, cases of acute conjunctivitis of bacterial origin with formation of follicles, as well as cases of chronic trachoma, upon which an intercurrent attack of acute catarrhal conjunctivitis has supervened. Again a chronic trachoma may be sometimes superadded to a simple acute conjunctivitis.

Many different opinions are rife as to the nature of the "Trachoma bodies" mentioned above, the most generally accepted view and the one I also put forward, is that these bodies do not represent any specific pathological formation, but are simply true lymph follicles. The primary form of these structures, so far as they can be observed clinically, consists in small, well defined clumps of lymph cells, scattered in the adenoid layer, especially in the upper tarsal conjunctiva, and appearing as yellowish-white, scarcely raised spots, the so-called primary granulations.

The appearance of these bodies in the conjunctiva is not of itself significant of trachoma, as it is well known that similar bodies are found in the conjunctiva, as a result of all kinds of irritation, bacterial and chemical, but where the body is significant, is in its subsequent changes.

All the/

All the clinical manifestations of the disease, both at their onset, and also for the most part at their height, depend upon the anatomical changes in the tissues, and especially upon those going on in the follicles, remembering the fact that the follicles infiltrate the whole of the adenoid tissue to a variable degree, and afford a suitable nidus for fresh deposits.

According to some authorities, the commonest mode of disappearance of the follicles is by the expulsion of their softened contents, after the epithelial covering has burst. Other observers show that the granules pass through a process of fibrous degeneration and cicatrization. It is also proved that they are spontaneously absorbed.

The capsule of the follicle is simply the surrounding normal connective tissue compressed by the growth of the follicle, and it is scarcely ever quite closed.

The tarsus is also considerably changed, giving rise to the troughlike distortion of the tarsus, which as a rule is more marked towards the lower margin near the line of the perforating blood vessels.

Conditions are found near the bulbar conjunctiva which are similar to those in the tarsal conjunctiva.

Also/

Also certain observers viz., Germann and Kuhnt have stated as a result of research that Trachoma also occurs in the lachrymal sac: though personally I have not observed it, though I have seen dacryocystitis associated with trachoma, but I had no evidence to say that the dacryocystitis was not present, before the patient became infected with trachoma.

One frequently finds asscciated with cases of Trachoma, a chronic rhinitis (serous).

## DIAGNOSIS.

In respect to the diagnosis, I would specially point out the difficulty of absolute diagnosis in an early case to one who has not had considerable experience of the disease: and would urge the advisability of a particularly methodical and careful examination of the whole conjunctival sac, laying special emphasis on the regions of the retrotarsal folds. Before giving special diagnostic points, let me briefly review the signs and stages:-

(a) The formation of small greyish-yellow spots, which lie in the deeper part of the conjunctiva with practically no sign of inflammation, and roughly speaking about the size of a pin's head: these spots I have called the primary granulations, which gradually develop into

(b) the round, projecting, yellowish-red granules or follicles proper, and the amount of subsequent inflammatory change in the conjunctiva depends on the size and number of these follicles and upon their slower or more rapid growth.

Now histologically we get identical follicles in numerous eye conditions, but the one that I would specially consider is the differential diagnosis from follicular conjunctivitis.

Clinically/

Clinically I call Trachoma, any granular conjunctivitis which has led to obvious hypertrophy or thickening, including, naturally, the gelatinous and cicatricial cases. And again I term follicular conjunctivitis, a case in which the follicles lie in a soft, perhaps slightly congested, but transparent conjunctiva with no visible hypertrophy. These latter follicles are less numerous and smaller, have a glassy transparent appearance, a well defined outline, and not seen on the upper lid as a rule. They lie on, rather than in, the conjunctiva, and do not spread, frequently arranged in rows, seldom seen on the tarsal cartilage. Practically speaking and to put it shortly, trachoma follicles, except for being well defined, are the opposite of what has been said in the preceding sentence.

In trachoma the conjunctiva loses its transparency, becomes thicker, uniformly congested, has papillary swellings, is roughened: the retrotarsal folds bulge forwards where the lids are everted. In follicular conjunctivitis, the connective tissue is never seriously affected, nor is the papillary body. The conjunctiva remains transparent, smooth and often pallid.

In follicular conjunctivitis the follicles disappear completely after a longer or shorter period, frequently/

frequently without any special treatment or even the most simple treatment, and leave no bad effects. Whereas trachoma follicles do not get better except with special treatment and even then may take months, and if untreated may lead to the many complications already mentioned.

In slight cases lateral illumination is helpful.

In making one's diagnosis, the first thing to do is to evert the lid. There are numerous lid elevators to be procured from the instrument maker, but the cheapest is to take a match, tell the patient to look down, grasp the cilia with finger and thumb and pull down as far as the patient will allow you, then place your match on the part of the lid which lies over the convex border of the tarsus and adjoining fornix, push down and gently rotate your match, without undue pressure on the eyeball, and quickly raise the ciliary margin, and you get a complete exposure of the conjunctiva and fornix.

If, on examination, you have a doubt as to whether it is follicular conjunctivitis or trachoma, that is to say, the case has not progressed far enough, then I would advise you to try some mild treatment for the former condition and watch the result of a few days treatment, if it recovers then go for follicular/

follicular conjunctivitis, if recovery does not take place the reason is obvious, viz., it is trachoma.

The next point I would draw attention to, is, that when diagnosing your case, you should distinguish the class to which your particular case belongs so that the appropriate therapeutic and prophylactic measure may be given.

Another point, simple in itself, but which might easily lead to an error in diagnosis, is where you find cilia growing obliquely, scratching the cornea and so producing a condition resembling mild pannus; this "false" pannus is also seen in other conditions e.g. marginal Keratitis, vascular corneal ulcers, and at times leprosy. Thorough examination of the everted lid will however clear up your diagnosis.

Trachoma in the second stage, may be mistaken for chronic blennorrhoea, and here the case is most rapidly diagnosed by the rapidity with which it reacts to the correct treatment, with the certain corroboration of a complete examination of the whole conjunctiva.

In the later stages, the most distinctive point is the well known scarring which is especially noticeable in the subtarsal sulcus. These scars might be confused with scars, the result of mechanical or chemical injuries, and it may be burns, but here the history/

the history of the case would clear up the diagnosis. Also we get scars in diphtheritic conjunctivitis, gonorrhoeal ophthalmia and pemphigus, here again history would help us considerably, and it is most unusual to get pannus in diphtheritic or gonorrhoeal conjunctivitis. In pemphigus we should in all probability get bullae elsewhere on the body and again it is a much rarer eye condition than Trachoma. Spring Catarrh may simulate cicatricial Trachoma, owing to the milky-white appearance of the tarsal conjunctiva, but in this case it is more diffusely uniform: the conjunctiva shows no scars, nor is there any incurving of the tarsus, or pannus and lastly the history of recurrent attacks during the summer will be told you.

Now we come to the differential diagnosis from tubercle and syphilis. Tubercular conjunctivitis is as a rule unilateral and usually associated with ulceration of the conjunctiva. Tubercle bacilli are present and we find the preauricular and submaxillary glands affected. History and the result of treatment will again clear up our diagnosis in the case of syphilitic conditions.

Another condition which may give rise to a doubtful diagnosis is the Morax-Axenfeld conjunctivitis/

conjunctivitis, but it is not a real difficulty as our trouble vanishes by using the microscope, when one sees the now well known Morax - Axenfeld diplo-bacillus, which bacilli are arranged in chains, usually devoid of a capsule, stain well with thionin blue and are decolourised by Gram. Examination of the conjunctiva, reveals it, smooth or very slightly papillary: there is marked redness of the skin at the canthi, which has caused it to be called angular conjunctivitis, and probably distinct thickening of the lid margins.

Many errors are made in cases which resemble acute Trachoma which are cured in a week or two by means of simple lotions, or disappear spontaneously if left to nature and most probably were simply follicular conjunctivitis. The appearance of the conjunctiva and particularly the papillary hypertrophy over the fornix in scrofulous conjunctivitis may simulate acute trachoma. The occurrence practically always in children with other signs of scrofula, and the rapid recovery under appropriate local and general treatment renders your correct diagnosis assured.

Seeds of corn, blown into the conjunctival sac, may lodge under the upper lid, and set up a violent inflammation with much swelling and papillary hypertrophy/

hypertrophy in a few days or weeks. As a rule it is unilateral, and the upper half of the cornea is usually scratched so markedly as to suggest a foreign body. Exposure of the conjunctiva and fornix, disclose the foreign body.

Again one has to watch for malingerers, who set up an inflammation by introducing foreign matters, which act as irritants, these cases can as a rule be detected by keeping the patient under observation for a few days.

I have already spoken of the microscope helping one in diagnosis in the case of Morax - Avenfeld conjunctivitis. I would just mention that it would help us also in acute blennorrhoea which in most cases is caused by the gonococcus, also in those forms of conjunctivitis caused by the Koch-Weeks bacillus, and the pneumococcus.

Finally let me say that it is most important to diagnose accurately the stage of every case of Trachoma, for only then can one give a correct prognosis, judge the danger of contagion, and direct prophylactic measurers and the line of treatment.

## PROGNOSIS.

Although Trachoma is now a much milder disease than in years gone by, still it must be regarded as an extremely serious disease. Trachoma has become a very chronic disease spreading slowly and almost imperceptibly among the lower orders and difficult to check, once it has got a firm footing.

I consider it advisable to give a guarded prognosis in every case, even though we now know that with early diagnosis and proper treatment, there is a good chance of a cure. One cannot predict the course of a case, because there is so much variation in every case.

Unfortunately, the disease begins so insidiously and with practically no subjective symptoms, that the patient does not consult his medical attendant, till the disease has reached a late stage. When cases of this kind come under my notice one judges of the prognosis, from the type, stage, and extent of the process, as well as from the condition of the cornea. At the same time I am a strong believer in having the general health of the patient as good as possible.

The condition of the cornea is always a point of special prognostic value. It it remains intact, a satisfactory/

satisfactory result can be looked for, both as regards complete recovery and maintenance of sight, and one can count on an ultimate cure under favourable external conditions within a reasonable period. If however, there is well marked pannus before treatment is commenced, a slow dragging course, complicated by unexpected exacerbations and endless relapses is not uncommon, even with favourable external conditions, and especially so with unfavourable external conditions.

I need hardly point out that in a case, with marked pannus distortion of the lids, etc., the prognosis as to probable permanent cure and recovery of sight is bad, although fortunately by the later mechanical and surgical methods, very good results are often obtained, even in extremely obstinate cases.

I would point out the possibility of reinfection with the possibility of the cornea becoming infected.

The general health of the patient, his constitution, whether good or bad, are all important for prognosis. Weakly, anaemic, and nervous people, or those with a tubercular or scrofulous family or personal history, are specially liable to infection. And in these patients, the disease runs a violent and obstinate course.

Narrowing/

Narrowing of the palpebral fissures is a bad sign. This forms a sac for micro-organisms and other injurious agents, and is specially seen in Chinese and Japanese.

The age of the patient is also important, a child, all things being equal has a better prognosis than an adult, no doubt due to greater regenerative powers.

The dwelling place of the patient and his whole surroundings, must also be considered, as from what I have already said, it is clear that the prognosis is worse if the patient continues to live in a dirty place, or where there is a chance of reinfection.

And lastly we must consider the social status of our patient, as an unfavourable status, poverty, worry, wretched dwellings, poor nourishment,and unhealthy mode of life, uncleanliness, work in a smoky or dusty atmosphere, all go towards a bad prognosis. On the other hand a better prognosis may be given in well-to-do patients. They consult the doctor sooner, because they pay more attention to health, and they are better able to avoid injurious influences. Again, they can remain longer under treatment and supervision. They are much less exposed to the risk of reinfection, and much less liable to suffer from sequelae.

## PROPHYLAXIS.

The question of prophylaxis is perhaps one of the most difficult in connection with Trachoma, of course I am speaking of civil work, where it is impossible to apply rules and regulations such as have been enforced in military life from the time of Napoleon, and the results of which, have been well exemplified in the Prussian army: if we could carry out these ideas in civil life then perhaps we should not think trachoma such a fell disease, as we do at present.

In the first place, the patients and those in contact with them must be instructed as to the infectious and dangerous character of the disease, and the fact that every eye disease with discharge is more or less infectious: this remark I would even urge in young practitioners, both for their personal safety and that of their patients. It may be that I am strongly biassed on this point, as I consider it highly probable, that I may have infected myself after examining my patients: and it was still more strongly borne upon me, when I went to consult Dr. J. M. White (of the U.S. Marine Service) who was most particular in his cleansing of his hands, both before and after he examined me. So it is an axiom, that the patient should have his own towel, and no one else/

no one else should on any account use it, and if possible the same remark applies to his washing utensils. Besides this general cleanliness, the people must keep their hands and eyes scrupulously clean, and abstain from all unnecessary rubbing of their eyes with their fingers.

Again it is stated that the virus may cling to various objects, - the floor, walls, doors, and dust,- so it is important that the house generally must be kept as clean as possible.

I would again urge as a prophylactic measure the early beginning of treatment, as Trachoma is so much more easily cured in the early stage. Any materials that are used for dressing the eyes should be burnt, unless it is a towel or something equally valuable, which should at once be washed in an antiseptic.

The great ideal in Trachoma would be isolation, but in civil life, unless it be in boarding schools or large institutions, it can hardly be carried out. But all patients must be kept under supervision for some time after they are cured.

These remarks apply more particularly to the patient, but one must also consider the question of the locality, and preventing it entering a state from a neighbouring infected state, as the Americans do, in their emigration laws. And here the main problems are:-/

problems are:-

(1) the prevention of the introduction of Trachoma from the neighbouring seriously infected countries;

(2) its extermination wherever it has gained a footing.

These remarks especially apply to my own sphere of work, viz., Hong-Kong, where I regret to say we get Trachoma, but very mild compared to Canton, the city of teeming millions, of shall I say, uneducated Chinese, who do not realise the dangers they are running, and again milder still when one sees the frightful cases from Swatow. Unfortunately we have no quarantine law in Hong-Kong for Trachoma, but I trust, that is one of the legislative battles of the future, and now that our Governor and His Council have taken the matter up, I live in hope that there is a happy future for us. The German Government in 1896 set the world a splendid example in this respect, in trying to stop the spread of the disease from the east to west by setting up guard stations,and they were not content in employing the ordinary medical men, but got into their employ the greatest authorities on Trachoma including Förster, Hirschberg, Kuhnt, Schmidt-Rimpler, Greeff and others.

Another important point, is that teachers in schools can be of the greatest use in helping in the prophylaxis/

prophylaxis of Trachoma, and in Prussia, infectious diseases of the eye in schools are treated by the Board of Health, which has drawn up and published, for the benefit of school teachers, certain directions for the prevention of the spread of Infectious Diseases of the Eye in Schools.

I think, this might be made to apply to our own infected colonies, and even at home where trachoma is by no means a rarity, and as a beginning, I think it would be a good thing that suitable instructions should be given to the scholars on the prevention of infection with Trachoma, and this might easily be accomplished by a series of popular lectures to the senior scholars.

I cannot urge too strongly the fact, that in order to ensure a permanent cure, it is absolutely necessary to keep apparently cured cases under observation and that, for a long time. The want of observation is the chief cause of numerous relapses. The supervision should be continued at least as long as any signs of inflammation remain, in bad cases which come too late under treatment, it may be for years. But this reporting may be only occasional, say once in six or twelve months. As a rule the patient can go on working, unless as in the case of a nurse, there is the question of close contact to be considered.

## TREATMENT.

The question of the treatment of Trachoma is a very big one, as any one who has had a large experience of it can say, and the drugs used in its treatment are many. The means of treatment consist of medicinal treatment, surgical treatment and electrical treatment. And at the same time I would point out that the biggest difficulty is the duration of treatment that is necessary in the great majority of cases, and this remark especially applies to patients belonging to the lower orders of society, who will not realise the dangers they run, in not attending to medical orders. They have this to be said for them, that necessity and the want of time, interrupt the painful treatment before the cure is complete. The result is relapse: and one cannot overlook the great numbers of patients whose worth dwindles more and more, whose lives are spoilt, and who provide a good source of infection to others.

It is utterly useless, to try medical treatment only in even moderately severe cases, one must help with surgical treatment, and the reverse holds good, that in severe cases, surgical treatment is hopeless, unless aided by medical treatment.

The principal aim in treatment, is to cure the disease/

disease in its earliest stages. The essential aim of prophylaxis is helped at the same time, and the spread of the complaint effectually prevented

In my own cases, after trying, mild astringents of many kinds and local applications of various forms of caustics, I now lay down the rule that in a moderately severe case: after examining the patient for constitutional traits and building up his general health, I order a lotion such as the following:-

P.4 Linci Sulphatis grs. ℈
Boroglyceridi 3ʃ
Ag. Destillati 3ɨ

and order him to use the drops thrice daily: if this prove too painful I include some cocaine hydrochlor in the bottle; some cases stand a stronger solution, but I seldom make it stronger than Zinc. Sulp. grs $\overdot{\text{III}}$ - 3ɨ water. I let the patient use this for a week and then examine again, if progress is not what it should be then I advise local applications and my vote is at present in favour of argyrol of which I order a 20% solution and paint the eyelids every second day to begin with.

If any excess of acute symptoms appear, the local application of cold or scarification by Jacobson's method helps considerably to be followed by the cautious/

cautious application of a weak astringent such as chlorine water solution, of lead acetate etc., and if requisite the use of atropin. Some early chronic cases with follicles but no inflammatory symptoms resolved under a purely hygienic and dietetic treatment, which consists in rest to the eye, cleanliness, change of air and especially plenty fresh air, wearing coloured glasses in bright lights, or in windy or dusty places.

If in spite of this, the granulations become worse, then the application of copper sulphate, might set up enough inflammation to cause absorption. When cicatrization takes place, the use of ointments may minimise the friction between the scarred conjunctiva and the cornea.

I would strongly point out the danger of applying silver nitrate and remind you that its action is to be astringent and <u>not</u> caustic.

Now comes the question of when it is more advisable to use copper sulphate in place of silver nitrate, or one of the many silver preparations now on the market. Roughly speaking when the condition present approximates to our formed idea of chronic blennorrhoea then use silver. On the other hand when the conjunctiva is a rigid, firm swelling, with pale, yellowish/

yellowish-red colour, and muco-serous or scanty secretion and presents the hypertrophic, granular condition, with gelatinous appearance, then use copper sulphate.

The remark on the danger of silver nitrate, also applies to copper sulphate and I would strongly advise that it is only lightly passed over the surface: and must not touch the cornea.

When the discharge is very copious, then a mild ointment for prevention of the lids sticking together is a useful adjunct.

In my heading of surgical treatment, I include the mechanical treatment, which is nothing more or less than an "expression" method and I personally prefer Knapp's roller forceps to any other form.

Expression causes the epithelium over the follicle to burst, the contents being expelled, so that the follicles are emptied with gross injury to the conjunctiva. It is practically painless after thorough cocainisation of the eye. Care must be taken to avoid adhesion of the folds of conjunctiva which are denuded of epithelium, by turning out the lids for two or three days.

I specially use Knapp's roller forceps when moderately large follicles occur without previous inflammation, or after the inflammation and discharge have subsided.

have subsided.

According to Raehlmann, most authors advise expression of the follicles when they are softened. The procedure then gives good results, especially at the end of the first stage and in the transition stage, and in early cases of gelatinous Trachoma.

In advanced gelatinous Trachoma, the use of roller forceps is dangerous, as it causes injury, frequently lacerating the fragile fornices with much scarring. Here the best thing is simple pressure and this can be carried out by means of Kundt's expresser.

In cases with actual infiltration of the tarsus, it is helpful to puncture the tarsus deeply especially the convex border. Expression is completed when no follicles can be discovered. And then one finishes with medical treatment.

The use of roller forceps applied correctly is said to prevent pannus and the shrinking due to cicatrization.

Many of the German observers have noticed the predilection of Trachoma for the fornices, and so recommended excision and Kundt specially recommends the conjunctivo-tarsal excision in

(1) All chronic forms with infiltration and thickening of the tarsus, whether the cornea is involved or not/

not:

(2) extensive chronic Trachoma, if the cornea is already involved or threatens to become so:

(3) in gelatinous Trachoma, if convex edge of the tarsus shows the typical thickening:

(4) even in cured Trachoma of the fornices, if the palpebral conjunctiva and tarsus are gelatinous or threaten to become so.

He does not advise the operation in

(1) early cases without corneal complications.

(2) if scarring has begun.

(3) if there is threatened xerosis. Kuhnt sums up the advantages of excision thus: the time required for bringing about a cure is extraordinarily reduced, lasting on an average only six weeks, including after treatment: secondary corneal complications are prevented or cured; entropion and ptosis are prevented or compensated; inflammatory sequelae, exacerbations, and reinfections are in most cases avoided. Expression permanently cures at the highest estimate only 10 per cent of cases, excision 50 to 60 per cent.

For cases of Trachoma in the stage of scarring, with healed conjunctiva, but still intensely infiltrated and thickened tarsus, leading generally to/

to obstinate pannus. Kuhnt advises excision of the tarsus. It is also useful in the second stage and in gelatinous Trachoma, and also when the conjunctiva bulbi is affected, the conjunctiva tarsi having healed and the tarsus alone being still diseased.

I would here say that the effectual treatment of Trachoma demands great experience, acute observation, and elaborate technique: and I do not strongly advise the expression form of treatment to the inexperienced operator: it is good in many cases, but will often fail in severe, complicated, and obstinate cases.

These latter, are the suitable cases for excision. Owing to the very infectious character of Trachoma, I strongly urge brother practitioners to keep special instruments for Trachoma.

The treatment must be accurately suited to the stage and special form of the disease, with occasional recourse to such methods as the galvano-cautery, the spoon massage, paying careful attention to the whole of the factors, external and individual, of the special case in hand at the time.

In children I advise expression if necessary, combined with subsequent treatment with drugs, and excision is to be contra-indicated.

The/

The surroundings of the patient and the general health must both be of the best possible.

If the limbus is much swollen, or the edge of the cornea inflamed corneal complications are to be feared. All irritating treatment must then be abandoned, and the cases treated like one of Keratitis.

Blepharospasm and blepharophimosis demand a canthoplastic operation, any blepharitis must be treated, the condition of the lachrymal passages must be looked into, and if dacryocystitis comes on, Axenfeld advises extirpation of the sac.

In trichiasis, if the lashes are diseased, the lid margin must be excised and the mucous membrane brought forward.

Entropion and ptosis are often permanently cured by the appropriate excision of the tarsus.

In obstinate pannus, one may use massage, spraying and irrigation, subconjunctival injections of saline solution, peritomy, slitting up of the individual vessels, or the galvano-cautery.
In xerophthalmia, narrowing of the palpebral aperture by sewing up the lids is useful, known as Rudins operation.

Electrical Treatment.

This form of treatment I have not had very much opportunity of trying: as it is somewhat expensive for private work, and the hospitals I work at in Hong Kong are not fitted up with the necessary plant. However I have had enough cases to express my opinion on this particular form of treatment.

With regard to apparatus, I use the ordinary X ray apparatus with a Davidson's brake: a lead glass basin protector with a localising tube (of half an inch diameter) which enables me to apply the rays on the eyelid affected. I prefer a soft tube with low fluorescence. I protect the eyeball either by (1) telling the patient to look down or

(2) by means of lead glass folds: and get over the difficulty of eversion by means of lid evertors, Weiss for preference. As a rule the distance is 30 centimetres. The average strength of the current is 10 volts. I begin with 5 minute sittings, thrice weekly, with the addition of the application of blue-stone once a fortnight.

My conclusions are that the rays exercised a favourable influence on the disease.

The infiltration diminished the granulations, the pannus disappeared and the subjective symptoms were ameliorated. Infiltration was the first to recede, and the granulations were slow to decay. So far/

far as my experience went, I had no unintentional results, and the tissues showed only a slight tendency to cicatrization. The ordinary treatment of Trachoma is preferable where there is no infiltration of the deeper layers; but in such a case where the usual methods have failed, I think the rays will be found to be of great benefit.

In association with the electrical treatment I always order some simple lotion, more from the idea of general cleanliness than of trying to cure the condition.

In one case, I used the expression treatment first, and came to the conclusion, that the subsequent electrical treatment shortened the period of treatment.

The electrical treatment is free from pain: and I think the pannus clears up more thoroughly.

The application of caustics after electrical treatment causes as a rule a greater reaction.

With regard to diet, there is nothing special I have found beneficial, and I order the diet most suitable to the individual patient with the special idea of keeping his general health as good as possible. But I insist that during treatment my patients avoid tobacco and alcohol, as I consider both have a deleterious influence on the disease, especially tobacco smoke.

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